RESPONSE

IN THE CLAIMS:

Kindly amend claims 1, 6, 18, 25, 30, 40-43, 45 and 47, and cancel claims 29, 44 and 46 without prejudice as follows:

1. (Presently amended) A film measurement apparatus comprising:

a light source configured to generate a light signal;

means for directing said light signal onto a patterned sample to obtain a reflected or transmitted light signal having a plurality of wavelength components, each having an intensity;

a one-spatial-dimension imaging spectrometer configured to receive said reflected or transmitted light signal, and derive therefrom a one-spatial-dimension spectral image comprising, for each of one or more locations represented by the image, a plurality of electrical signals, each representative of the intensity of a wavelength component of the reflected or transmitted light at the location;

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a translation mechanism to relatively translate the sample relative to the light source; and

a computer configured to control the translation mechanism to relatively translate the sample relative to the light source so that said one-spatial-dimension imaging spectrometer [produces]combines a plurality of one-spatial-dimension spectral images to produce a two-spatial-dimension spectral image, and the computer is further configured to locate one or more measurement locations on or from said two-spatial-dimension spectral image, and derive [[a]]one or more measurements of at least one property of at least one film of said sample from spectral information obtained from said [plurality of one-spatial dimension spectral images]one or more measurement locations.

2. (Previously presented) The apparatus of claim 1 in which the translation mechanism moves the sample relative to the light source.

3. (Previously presented) The apparatus of claim 1 wherein the computer is configured to form a two-spatial-dimensional image from the plurality of one-spatial-dimensional images, analyze the two-dimensional image to find one or more predetermined measurement locations, and measure one or more film properties from spectral information obtained at the one or more predetermined locations.

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4. (Original) The apparatus of claim 1 where other film properties besides film thickness, such as optical constants and doping density, are determined from the spectral reflectance data.

5. (Original) The apparatus of claim 1 where the sample translation mechanism is an integral part of equipment used for the manufacture of semiconductor microelectronics.

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6. (Presently amended) A film measurement apparatus comprising:

a light source configured to generate a light signal;

a one-spatial-dimension imaging spectrometer configured to receive light from said light source that has been reflected or transmitted by a patterned sample, and derive therefrom a one-spatial-dimension spectral image comprising, for each of one or more locations represented by the image, a plurality of signals, each signal representative of the intensity of a wavelength component of the reflected or transmitted light at the location; and

a computer configured to receive from said one-spatial-dimension imaging spectrometer a plurality of one-spatial-dimension spectral images representative of a region of a sample, combine the plurality of one-spatial-dimension spectral images to form a two-spatial-dimension spectral image, locate one or more measurement locations on or from said two-spatial-dimension spectral image, and derive, from spectral information obtained from the [plurality of one-spatial-dimension spectral images]one or more measurement locations, [[a]]one or more measurements of one or more properties of at least one film of said sample.

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7. (Original) The apparatus of claim 6 where a translation mechanism is used to move the measured sample relative to the one-spatial-dimension imaging spectrometer to obtain a series of one-spatial-dimension spectral images of the sample.

8. (Original) The apparatus of claim 6 where a translation mechanism is used to move the one-spatial-dimension imaging spectrometer relative to the measured sample to obtain a series of one-spatial-dimension spectral images of the sample.

9. (Original) The apparatus of claim 6 where moving mirrors or lenses are used to obtain a series of one-spatial-dimension spectral images of the sample.

10. (Original) The apparatus of any of claims 7, 8, or 9 where the resultant one-spatial-dimension spectral images are combined to form a two-spatial-dimension image of the sample.

11. (Previously presented) The apparatus of claim 10 wherein at least one wavelength component of said two-spatial-dimension spectral image is analyzed to find one or more pre-determined measurement locations, and measurements of one or more film properties are derived from spectral information obtained at the one or more pre-determined measurement locations.

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12. (Original) The apparatus of claim 6 where the film property to be determined is thickness.

13. (Original) The apparatus of claim 6 where the film property to be determined is refractive index.

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14. (Original) The apparatus of claim 6 where the film property to be determined is extinction coefficient.

15. (Original) The apparatus of claim 6 where the one-spatial-dimension imaging spectrometer communicates the measured light intensity to the computer via an optical communication link.

16. (Original) The apparatus of claim 6 where the one-spatial-dimension imaging spectrometer communicates the measured light intensity to the computer via wireless communications.

17. (Original) The apparatus of claim 7 where the sample translation mechanism is an integral part of equipment used for the manufacture of semiconductor microelectronics.

18. (Presently amended) A method of measuring one or more properties of at least one film of a patterned sample by:

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forming a plurality of one-spatial-dimension spectral images, representative of a region of the sample, from light reflected off of or transmitted through the sample, each image comprising, for each of one or more locations represented by the image, a plurality of signals, each representative of a wavelength component of the reflected or transmitted light at the location;[[and]]

combining the plurality of one-spatial-dimension spectral images to form a two-spatial-dimension spectral image;

locating one or more measurement locations on or from the two-spatial-dimension spectral image; and

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analyzing spectral data obtained from the [plurality of one-spatial-dimension spectral images]one or more measurement locations to determine one or more measurements of one or more properties of the film.

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19. (Original) The method of claim 18 further comprising successively formed one-spatial dimension spectral data representative of successive portions of the sample.

20. (Original) The method of claim 19 where the successively formed spectral data representative of successive portions of the sample are combined to form a two-spatial-dimension spectral image of the sample.

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21. (Previously presented) The method of claim 20 further comprising determining one or more measurement locations from the two-spatial-dimension spectral image of the sample, and deriving a measurement of one or more properties of one or more films of the sample from spectral information obtained from one or more of the measurement locations.

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22. (Original) The method of claim 18 wherein the film property to be determined is thickness.

23. (Original) The method of claim 18 where the film property to be determined is refractive index.

24. (Original) The method of claim 18 where the film property to be determined is extinction coefficient.

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25. (Presently amended) A film measurement system comprising:

a light source configured to generate a light signal;

a one-spatial-dimension imaging spectrometer configured to receive light from said light source that has been reflected or transmitted by a patterned sample, and derive therefrom a one-spatial-dimension spectral image comprising, for each of one or more locations represented by the image, a plurality of signals, each signal representative of the intensity of a wavelength component of the reflected or transmitted light at the location; and

a computer configured to receive from said one-spatial-dimension imaging spectrometer a plurality of one-spatial-dimension spectral images representative of a region of the sample, combine the plurality of one-spatial-dimension spectral images to form a two-spatial-dimension spectral image, locate one or more measurement locations on or from the two-spatial-dimension spectral image, and derive, from spectral data obtained from the [plurality of images]one or more

measurement locations, [[a]]one or more measurements of one or more properties of at least one film of said sample.

26. (Previously presented) The system of claim 25 further comprising a translation mechanism which is used to move the sample relative to the light source to obtain a series of one-spatial-dimension spectral images of a region of the sample.

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27. (Previously presented) The system of claim 25 further comprising a translation mechanism which is used to move the light source relative to the sample to obtain a series of one-spatial-dimension spectral images of a region of the sample.

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28. (Original) The system of claim 25 where moving mirrors or lenses are used to obtain a series of one-spatial-dimension spectral images of the sample.

29. (Canceled) The system of any of claims 26, 27, or 28 where the resultant one-spatial-dimension spectral images are combined to form a two-spatial-dimension image of the sample.

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30. (Presently amended) The system of any of claims 26, 27, or 28[[29]] where at least one wavelength component of said two-spatial-dimension spectral image is analyzed to find one or more pre-determined measurement locations, and measurements of one or more film properties are derived from spectral information obtained at the one or more pre-determined measurement locations.

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31. (Original) The system of claim 25 where the film property to be determined is thickness.

32. (Original) The system of claim 25 where the film property to be determined is refractive index.

33. (Original) The system of claim 25 where the film property to be determined is extinction coefficient.

34. (Original) The system of claim 25 where the one-spatial-dimension imaging spectrometer communicates the measured light intensity to the computer via an optical communication link.

35. (Original) The system of claim 25 where the one-spatial-dimension imaging spectrometer communicates the measured light intensity to the computer via wireless communications.

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36. (Original) The system of claim 26 where the sample translation mechanism is an integral part of equipment used for the manufacture of semiconductor microelectronics.

37. (Previously presented) The apparatus of claims 1 or 6 wherein said one-spatial-dimension spectral image is a line image.

38. (Previously presented) The method of claim 18 wherein said one-spatial-dimension spectral image is a line image.

39. (Previously presented) The system of claim 25 wherein the one-spatial-dimension spectral image is a line image.

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40. (Presently amended) A system for measuring one or more properties of one or more films of a <u>patterned</u> sample comprising:

means for generating light;

means for directing the light to the sample;

means for receiving light reflected from or transmitted through the sample, and deriving therefrom a one-spatial-dimension spectral image comprising, for each of one or more locations representing by the image, a plurality of signals, each representative of a wavelength component of the reflected or transmitted light at the location;

means for relatively translating the generating means and the sample; and

means for <u>combining a plurality of one-spatial-dimension spectral images from said means for receiving to form a two-spatial-dimension spectral image, locating one or more measurement locations on or from the two-spatial-dimension spectral image,</u> deriving [[a]] <u>one or</u> measurements of one or more properties of one or more films of said sample from spectral information obtained from [a plurality of one-spatial-dimension spectral images of said sample]<u>said one or more measurement locations</u>.

41. (Presently amended) A method of measuring one or more properties of one or more films of a <u>patterned</u> sample comprising:

a step for generating light from a generating means;

a step for directing the light to the sample;

a step for deriving, from light reflected from or transmitted through the sample, a plurality of one-spatial-dimension spectral images, each comprising, for each of one or more locations

represented by the image, a plurality of signals, each representative of a wavelength component of the received or transmitted light at the location;[[and]]

a step for combining the plurality of one-spatial-dimension spectral images to form a two-spatial-dimension spectral image;

a step for locating one or more measurement locations on or from said two-spatial-dimension spectral image;

a step for deriving, from spectral information obtained from the [plurality of images]one or more measurement locations, [[a]]one or more measurements of one or more properties of one or more films of said sample.

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42. (Presently amended) A system for measuring one or more properties of one or more films of a patterned sample comprising:

a light source for generating light;

one or more optical elements for directing the light to the sample;

a one-spatial-dimension spectrometer for receiving light reflected from or transmitted through the sample, and deriving therefrom a one-spatial-dimension spectral image comprising, for each of one or more locations represented by the image, a plurality of signals, each representative of a wavelength component of the reflected or transmitted light at the location;

a translation mechanism for relatively translating the light source and the sample; and

a processor for controlling the translation mechanism to relatively translate the light source and the sample, so that the spectrometer produces a plurality of one-spatial-dimension spectral images, and the processor combines the plurality of one-spatial-dimension spectral images to form a two-spatial-dimension spectral image, locates one or more measurement locations on or from the two-spatial-dimension spectral image, and derives one or more measurements of one or more properties of one or more films of the sample from spectral information obtained from the [plurality of one-spatial-dimension spectral images]one or more measurement locations.

43. (Presently amended) A method of measuring one or more properties of one or more films of a patterned sample comprising:

generating light from a light source;

directing the light to the sample;

deriving, from light reflected from or transmitted through the sample, a plurality of one-spatial-dimension spectral images, each comprising, for each of one or more locations represented by the image, a plurality of signals, each representative of a wavelength components of the reflected or transmitted light at the location;[[and]]

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combining the plurality of one-spatial-dimension spectral images to form a two-spatial-dimension spectral image;

locating one or more measurement locations on or from the two-spatial-dimension spectral image; and

deriving one or more measurements of one or more properties of the one or more films from spectral information obtained from the [plurality of images]one or more measurement locations.

44. (Canceled) ~~The system of claim 42 wherein the processor forms a two-dimensional image from the plurality of one-spatial-dimensional spectral images, and derives the measurement from spectral information obtained from the two-dimensional image.~~

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45. (Presently amended) The system of claim [[44]]43 wherein the processor analyzes the two-dimensional image to find one or more predetermined measurement locations, and derives one or more measurements from spectral information obtained from the two-dimensional image at the one or more predetermined measurement locations.

46. (Canceled) ~~The method of claim 43 wherein the second deriving step further comprises forming a two-dimensional image from the plurality of one-spatial-dimension spectral images, and deriving the measurement from spectral information obtained from the two-dimensional image.~~

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47. (Presently amended) The method of claim [[46]]43 wherein the second deriving step further comprises analyzing the two-dimensional image to find one or more predetermined measurement locations, and deriving one or more measurements from spectral information obtained from the two-dimensional image at the one or more predetermined measurement locations.